

WHAT IS CLAIMED IS:

1. A digital protection relay with a time sync function, comprising:

5 analog input means for converting an analog quantity of electricity to a digital quantity of electricity by sampling the analog quantity of electricity input from a power system at predetermined cycles, and;

10 time sync means for receiving via a communication medium a discrimination code of a predetermined format that is generated on the basis of a reference timing generated based on a reception signal from a positioning system, and specifying a sampling timing of the digital quantity of electricity on the basis of the received discrimination code; and

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 determination means for comparing the quantity of electricity, the sampling timing of which is specified, with a determination value, thereby discriminating the presence/absence of occurrence of a fault in the power system.

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2. The digital protection relay with a time sync function, according to claim 1, wherein the time sync means receives time data from a time signal generator, and specifies the sampling timing of the digital amount on the basis of the discrimination code and the received time data.

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3. The digital protection relay with a time sync

function, according to claim 2, wherein the time sync means comprises:

5 a reception circuit that receives the discrimination code and the time data transmitted from the time signal generator via the communication medium;

a code discrimination circuit that discriminates the reference timing on condition that the discrimination code received by the reception circuit coincides with a desired code;

10 a time calculation circuit that calculates the sampling timing on the basis of the reference timing discriminated by the code discrimination circuit and the time data; and

15 a sampling sync circuit that specifies the sampling timing of the digital quantity of electricity on the basis of the sampling timing calculated by the time calculation circuit.

4. The digital protection relay with a time sync function, according to claim 2, wherein the time sync means further comprises communication monitor means for monitoring the soundness of at least one of the transmission circuit of the time signal generator, the communication medium and reception circuit on the basis of the received time data and discrimination code.

25 5. The digital protection relay with a time sync function, according to claim 2, wherein the time data is superimposed as a signal on the discrimination code,

and

the time sync means comprises:

a reception circuit that receives the superimposed signal;

5 a collation circuit that collates a logic value of the superimposed signal received by the reception circuit at a cycle shorter than a pulse cycle of the discrimination code to confirm whether a predetermined collation condition is met or not, and outputs
10 a collation output under a predetermined output condition, on condition that the predetermined collation condition is met by a predetermined number of times in succession;

 a code separation circuit that separates time data
15 and a discrimination code from the collation output input from the collation circuit, and generates the reference timing when the separated discrimination code coincides with a predetermined discrimination code;

 a time calculation circuit that calculates the
20 sampling timing on the basis of the reference timing and time data output from the code separation circuit;
and

 a sampling sync circuit that specifies the
sampling timing of the digital quantity of electricity
25 on the basis of the sampling timing calculated by the time calculation circuit.

6. A method of determining a fault in a digital

protection relay with a time sync function, the method comprising:

5 converting an analog quantity of electricity to a digital quantity of electricity by sampling the analog quantity of electricity input from a power system at predetermined cycles;

10 receiving via a communication medium a discrimination code of a predetermined format that is generated on the basis of a reference timing generated based on a reception signal from a positioning system, and specifying a sampling timing of the digital quantity of electricity on the basis of the received discrimination code; and

15 comparing the quantity of electricity, the sampling timing of which is specified, with a determination value, thereby discriminating the presence/absence of occurrence of a fault in the power system.

20 7. The method of determining a fault according to claim 6, wherein the specifying of the sampling timing includes receiving time data from a time signal generator and specifying the sampling timing of the digital amount on the basis of the discrimination code and the received time data.

25 8. The method of determining a fault according to claim 7, wherein the specifying of the sampling timing includes:

receiving the discrimination code and the time data transmitted from the time signal generator via the communication medium;

discriminating the reference timing on condition
5 that the received discrimination code coincides with a desired code;

calculating the sampling timing on the basis of the discriminated reference timing and the time data; and

10 specifying the sampling timing of the digital quantity of electricity on the basis of the calculated sampling timing.

9. The method of determining a fault according to claim 7, further comprising monitoring the soundness of
15 the communication medium on the basis of the received time data and discrimination code.

10. The method of determining a fault according to claim 7, wherein the time data is superimposed as a superimposed signal on the discrimination code, and

20 the specifying of the sampling timing comprises: receiving the superimposed signal;

collating a logic value of the received superimposed signal at a cycle shorter than a pulse cycle of the discrimination code to confirm whether a
25 predetermined collation condition is met or not, and outputting a collation output under a predetermined output condition, on condition that the predetermined

collation condition is met by a predetermined number of times in succession;

separating time data and a discrimination code from the collation output, and generating the reference timing when the separated discrimination code coincides with a predetermined discrimination code;

calculating the sampling timing on the basis of the generated reference timing and time data; and

specifying the sampling timing of the digital quantity of electricity on the basis of the calculated sampling timing.